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Daniels et al.

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(54) **TONER CARTRIDGE CONTAINER AND SEAL**

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Related U.S. Application Data

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G03G 15/08 (2006.01)

(52) **U.S. Cl.**
CPC ***G03G 15/0894*** (2013.01); ***G03G 15/0884*** (2013.01)

(58) **Field of Classification Search**
CPC G03G 15/0832; G03G 15/0841
See application file for complete search history.

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Primary Examiner — Victor Verbitsky

(57) **ABSTRACT**

A method of remanufacturing an imaging cartridge comprising a toner hopper having a toner bag and not having a seal port, the method comprising forming a seal port in the toner hopper; disposing a replacement toner container in the toner hopper, the replacement toner container including a removable seal having a seal tail; and inserting a portion of the seal tail through the seal port. A method of remanufacturing an imaging cartridge comprising a toner hopper having a toner bag and not having a seal port, the method comprising providing a replacement toner hopper having a seal port; removing the toner hopper not having the seal port from the imaging cartridge; and attaching the replacement toner hopper having a seal port to the imaging cartridge.

4 Claims, 10 Drawing Sheets

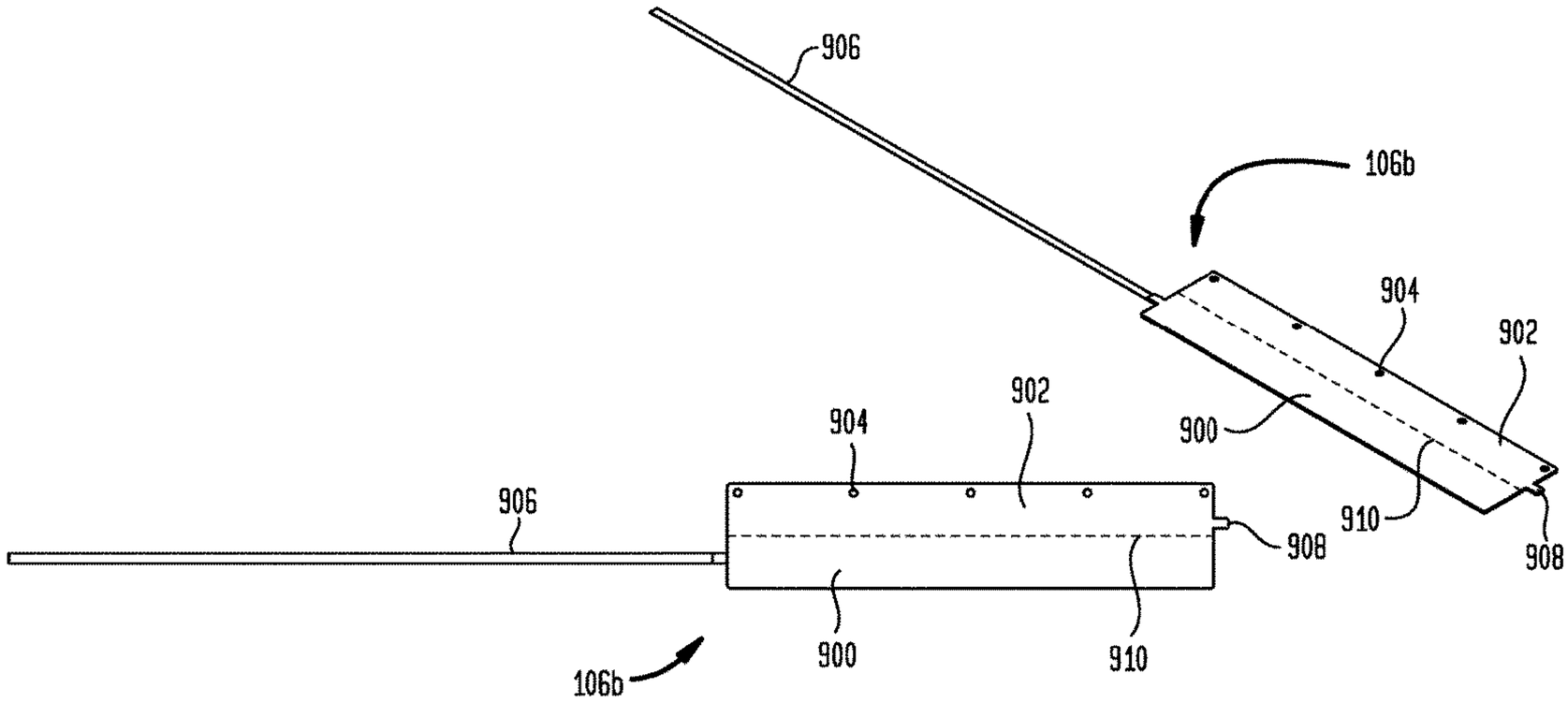


FIG. 1

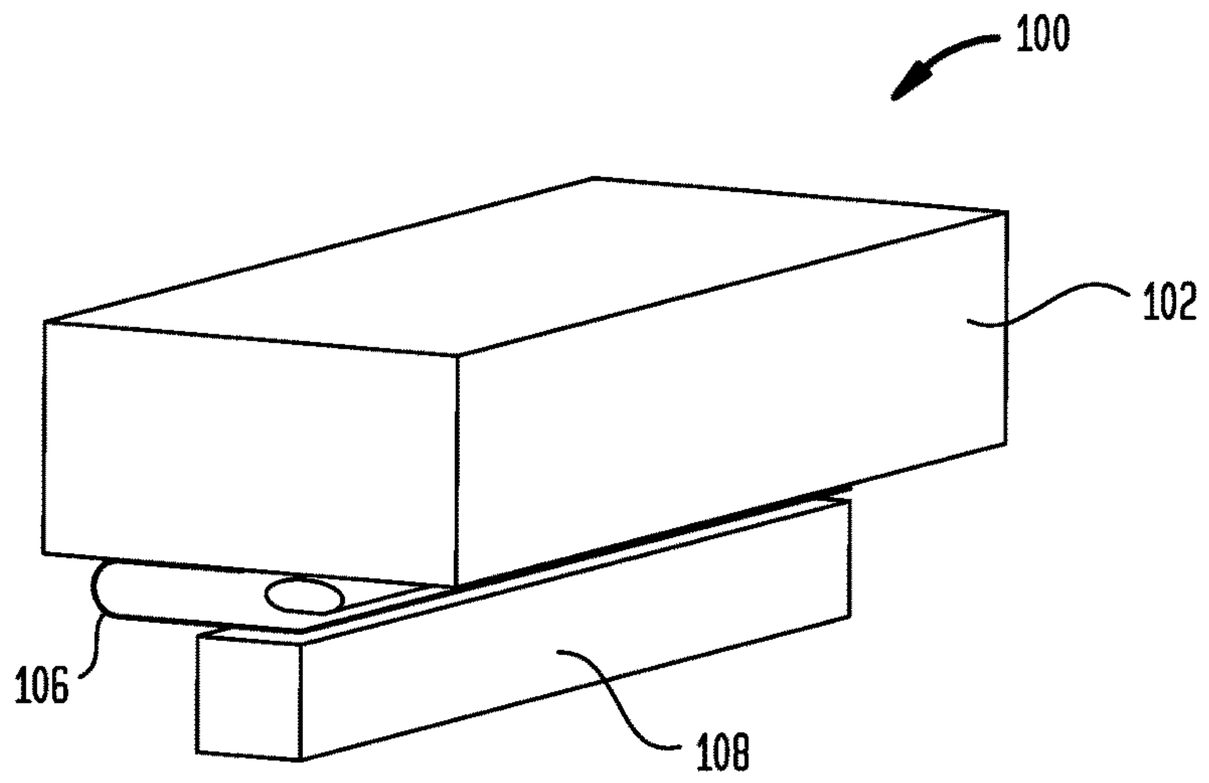


FIG. 2

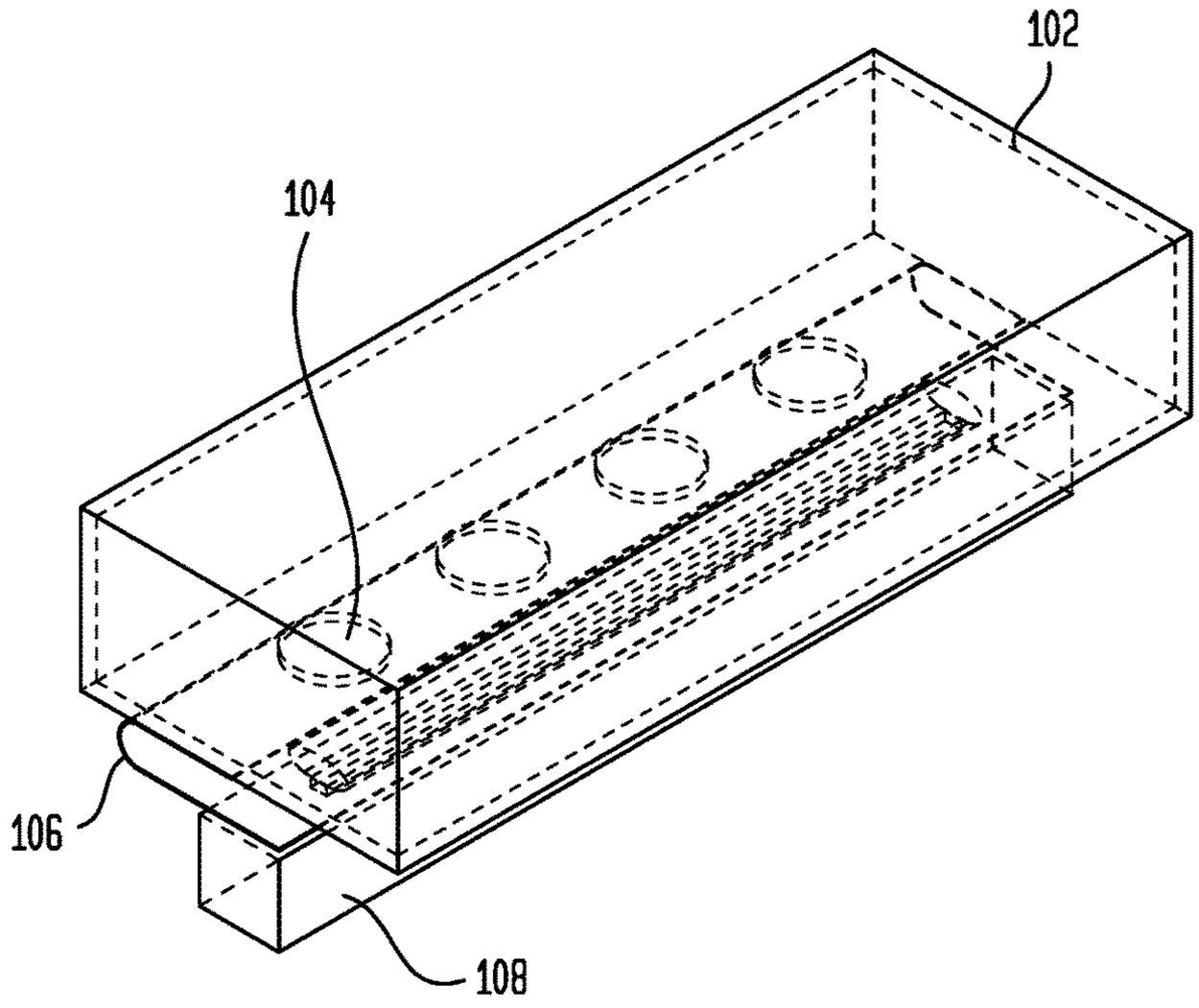
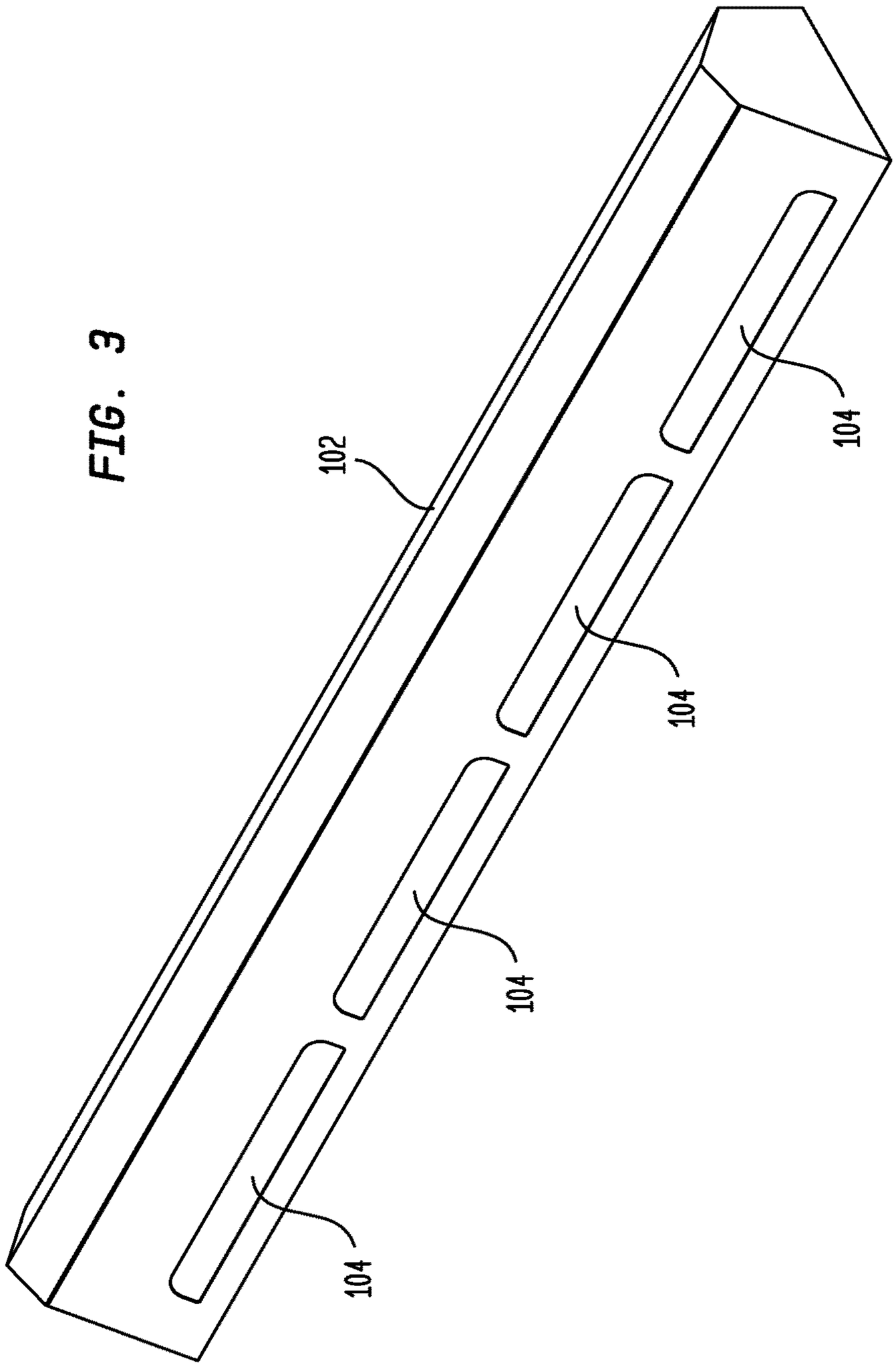


FIG. 3



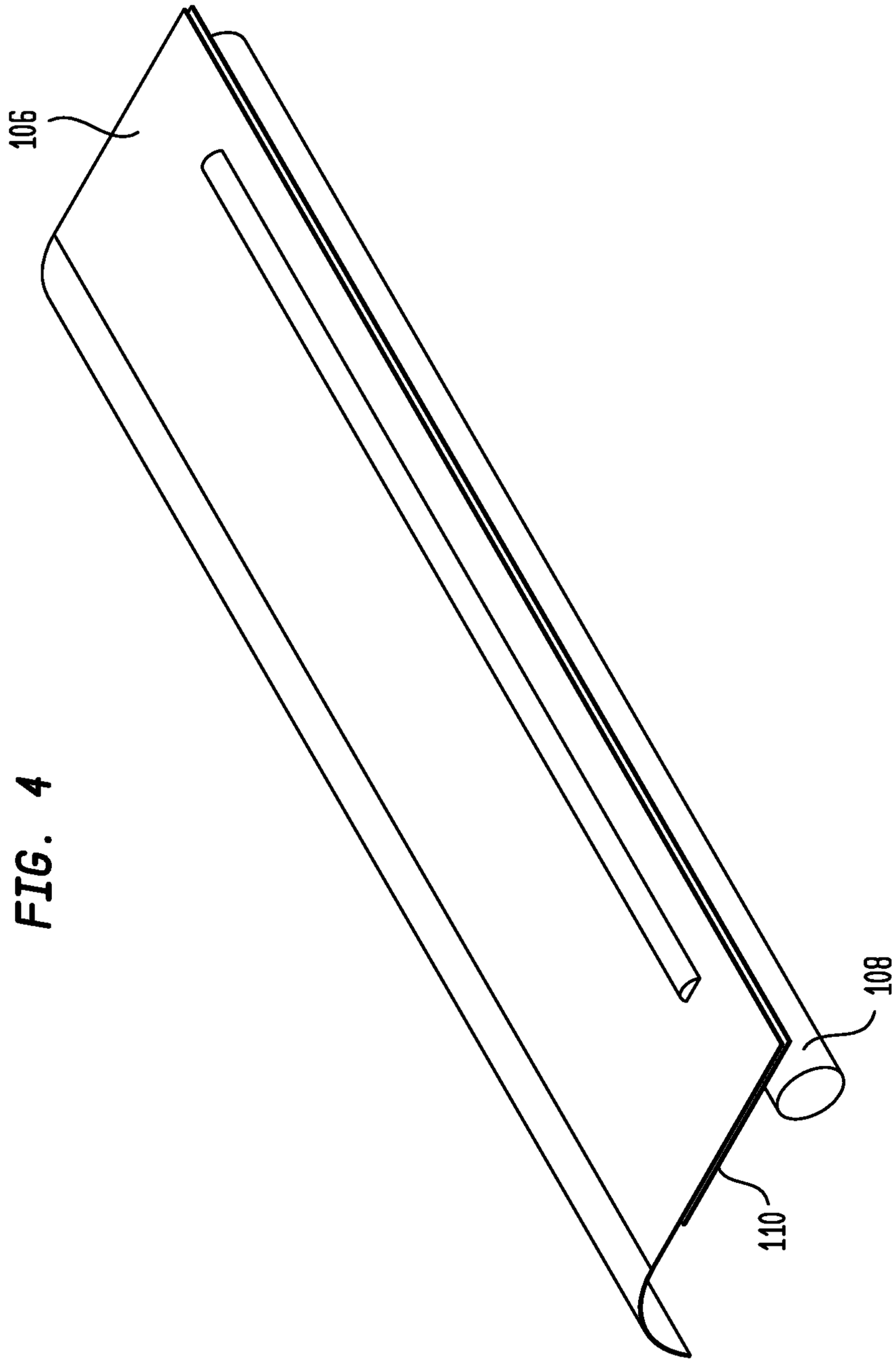


FIG. 4

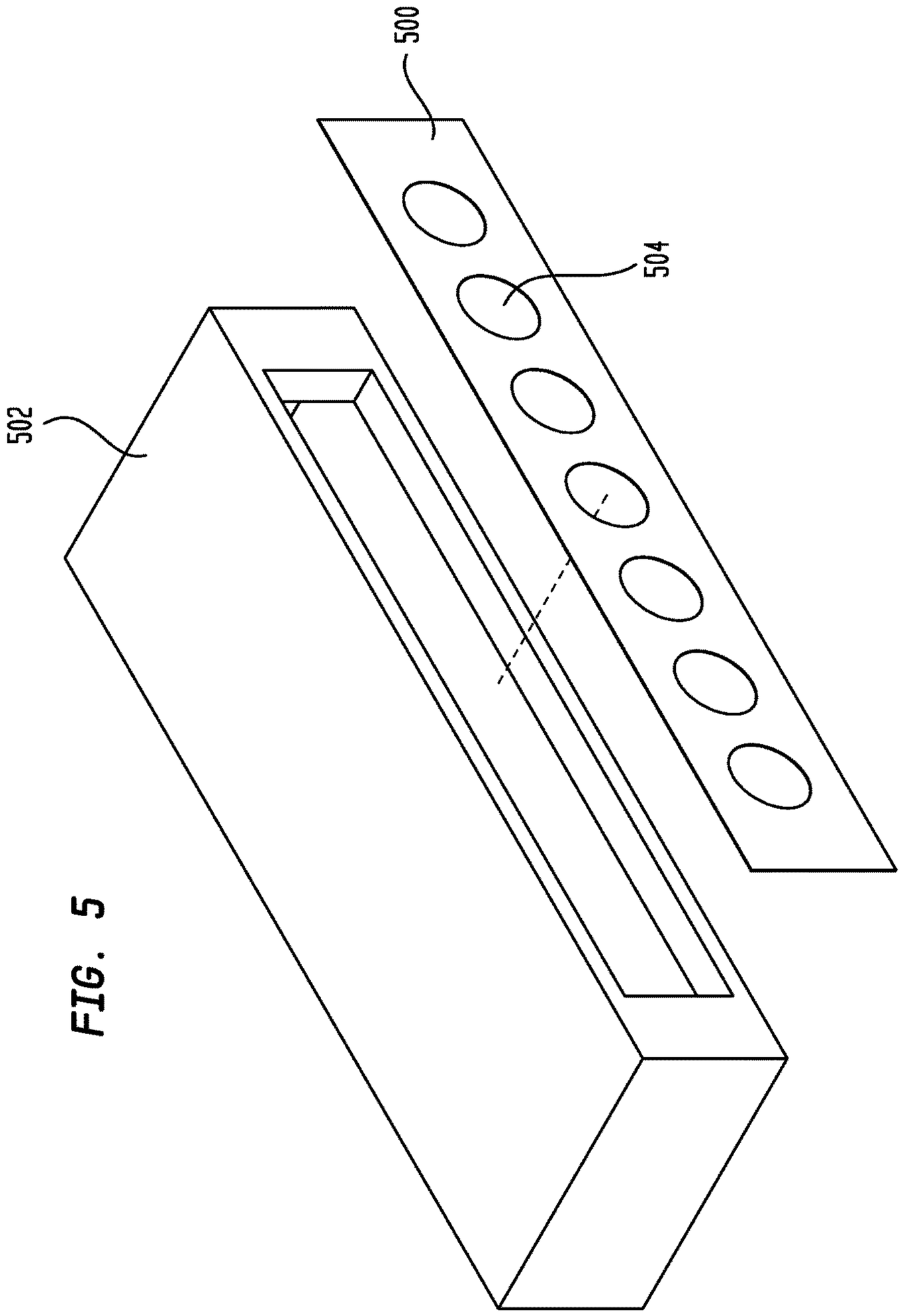


FIG. 5

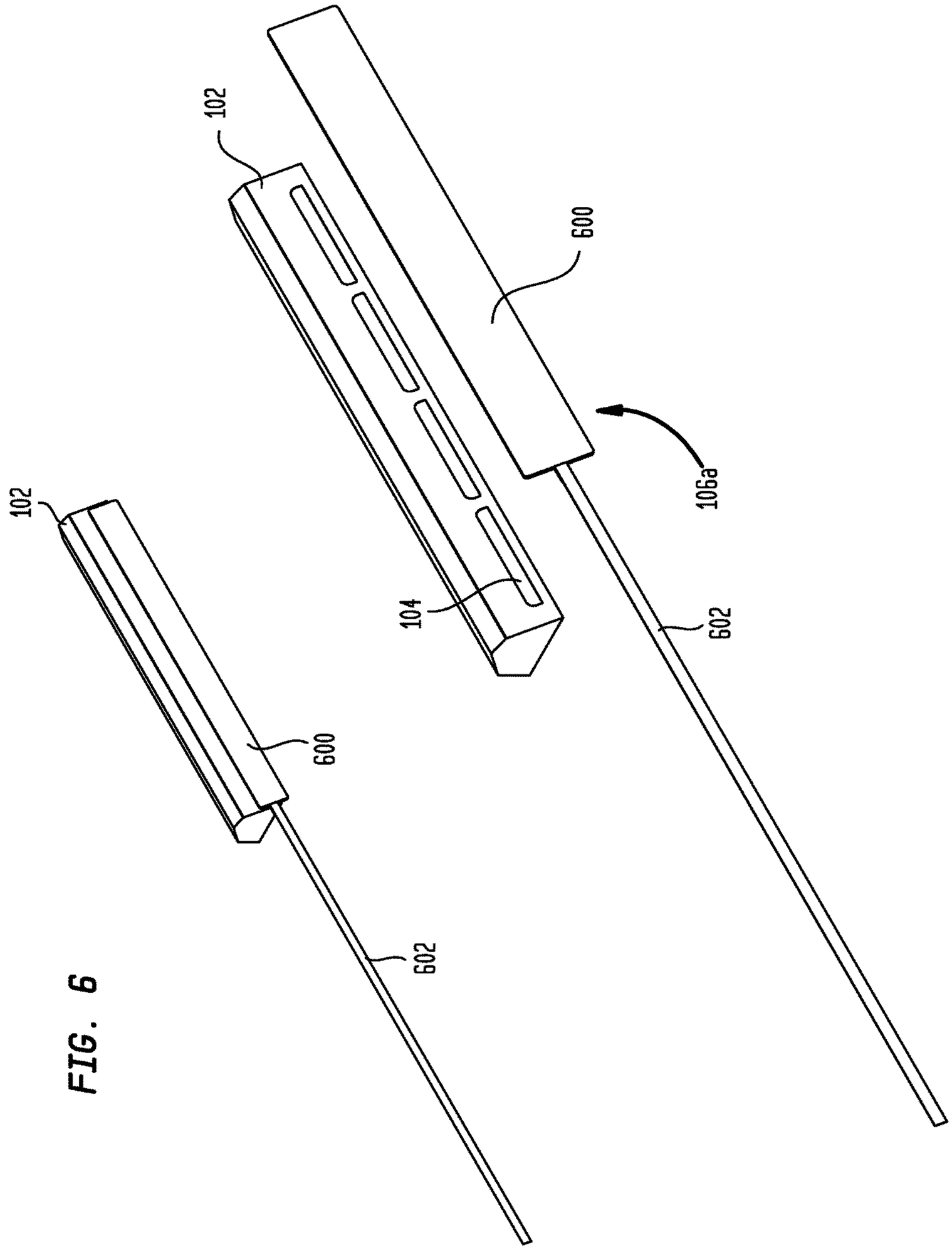


FIG. 6

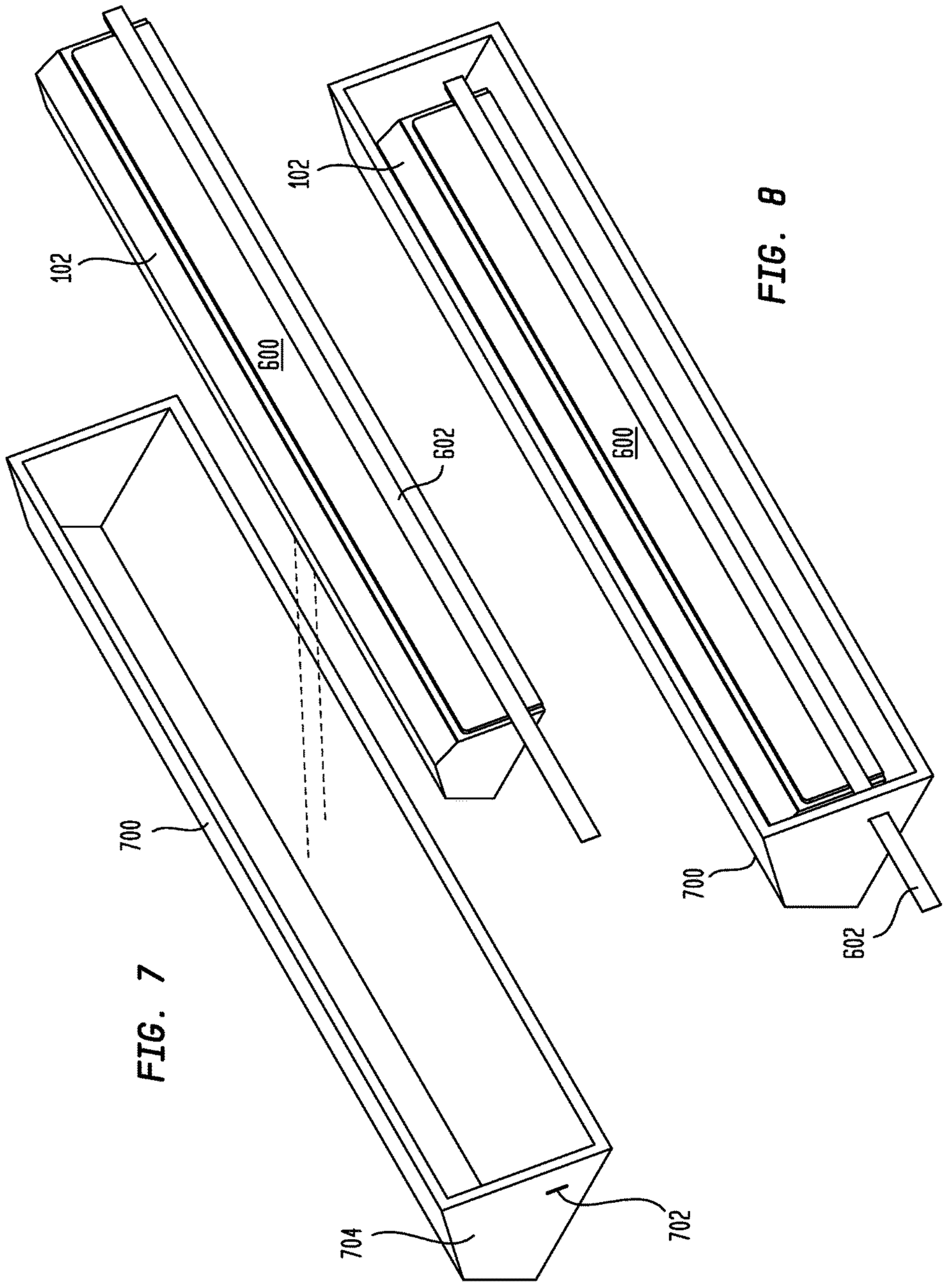


FIG. 7

FIG. 8

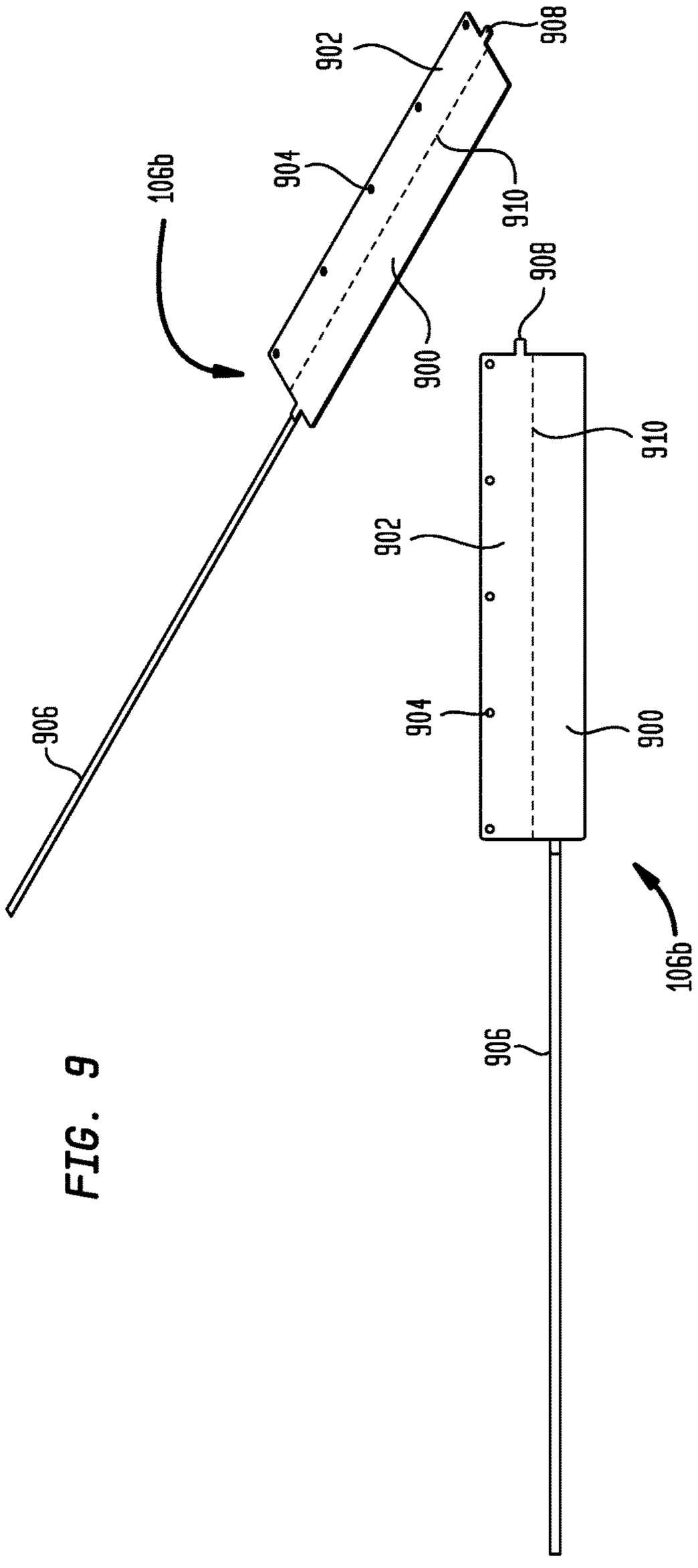


FIG. 9

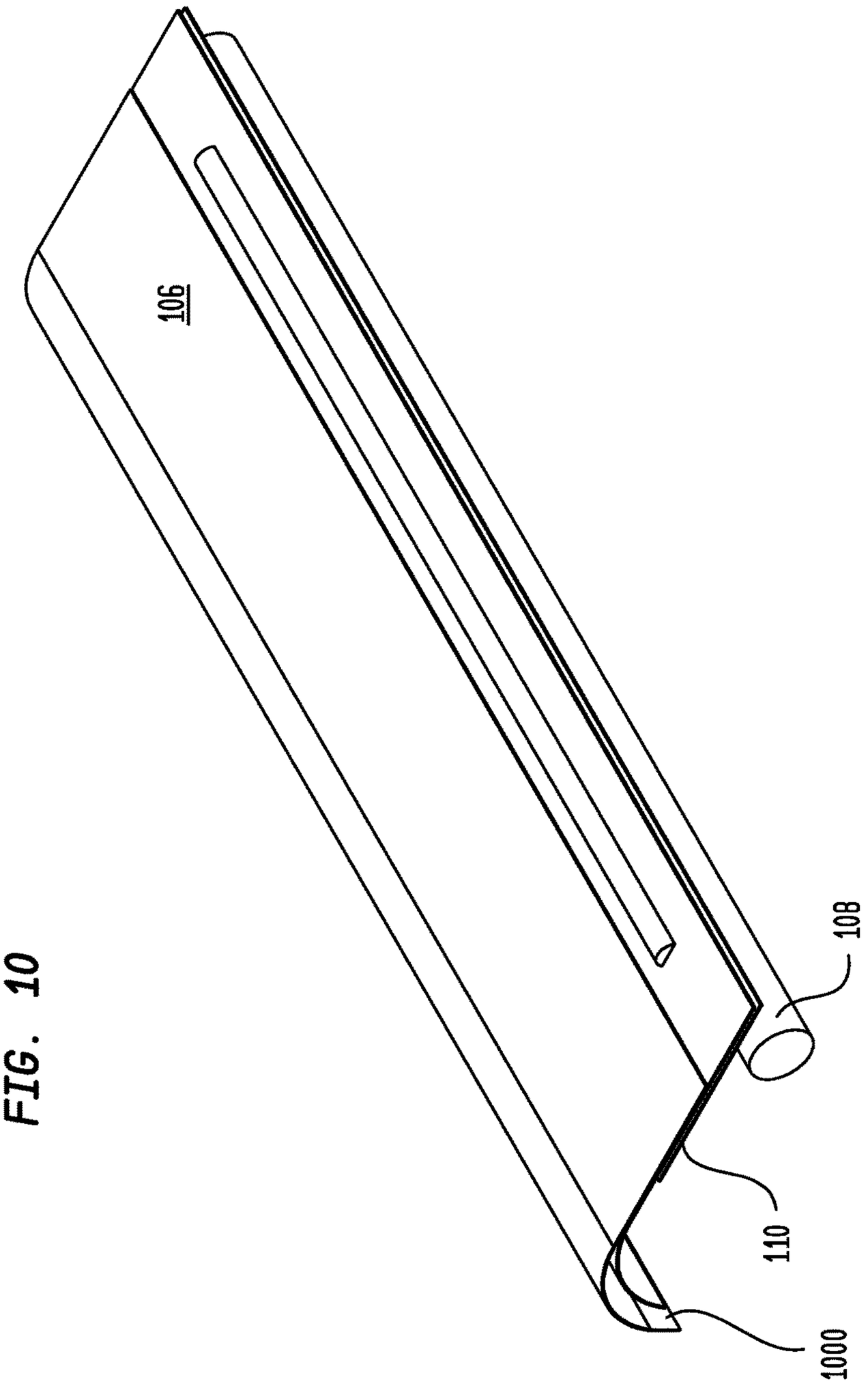
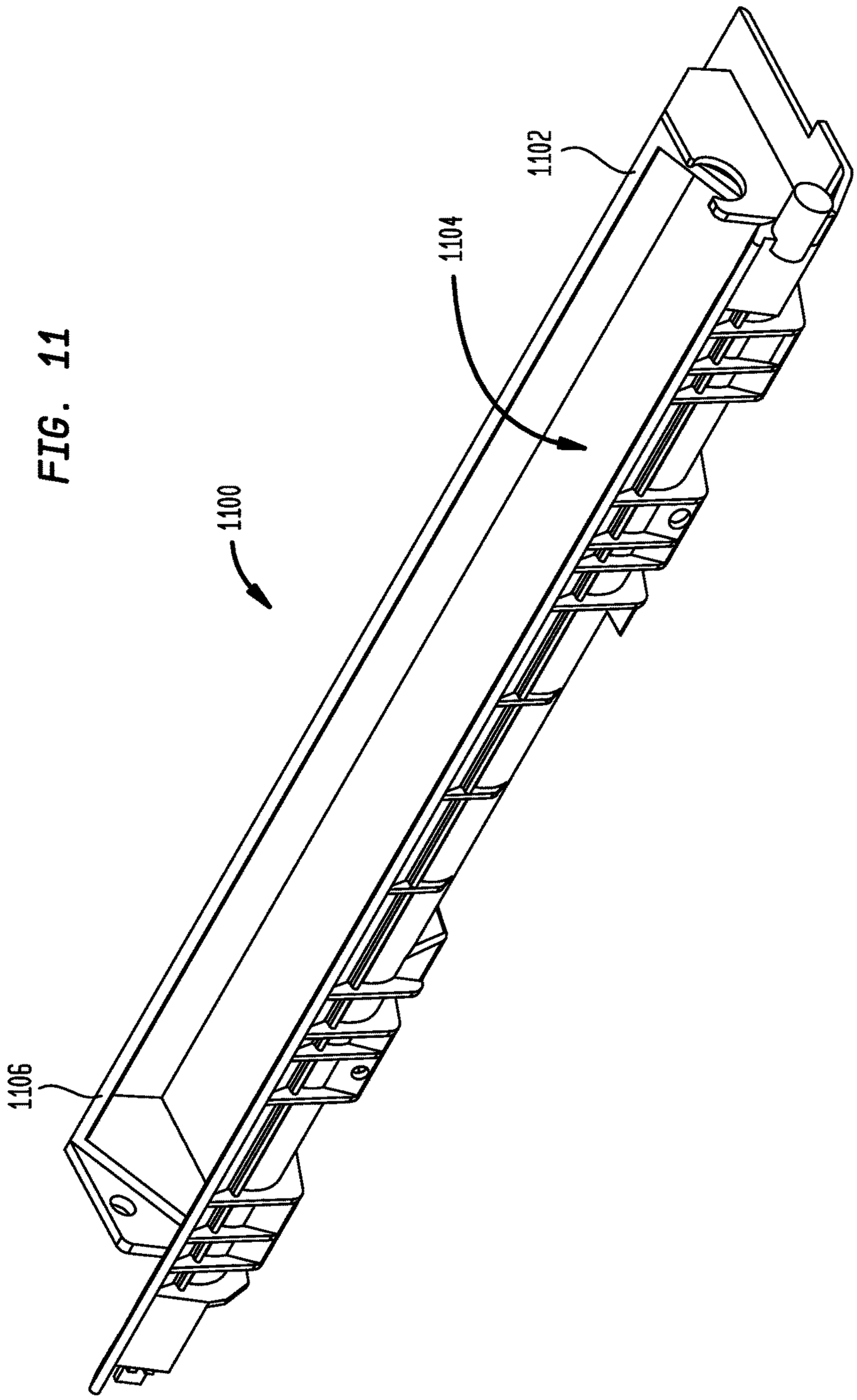


FIG. 10

FIG. 11



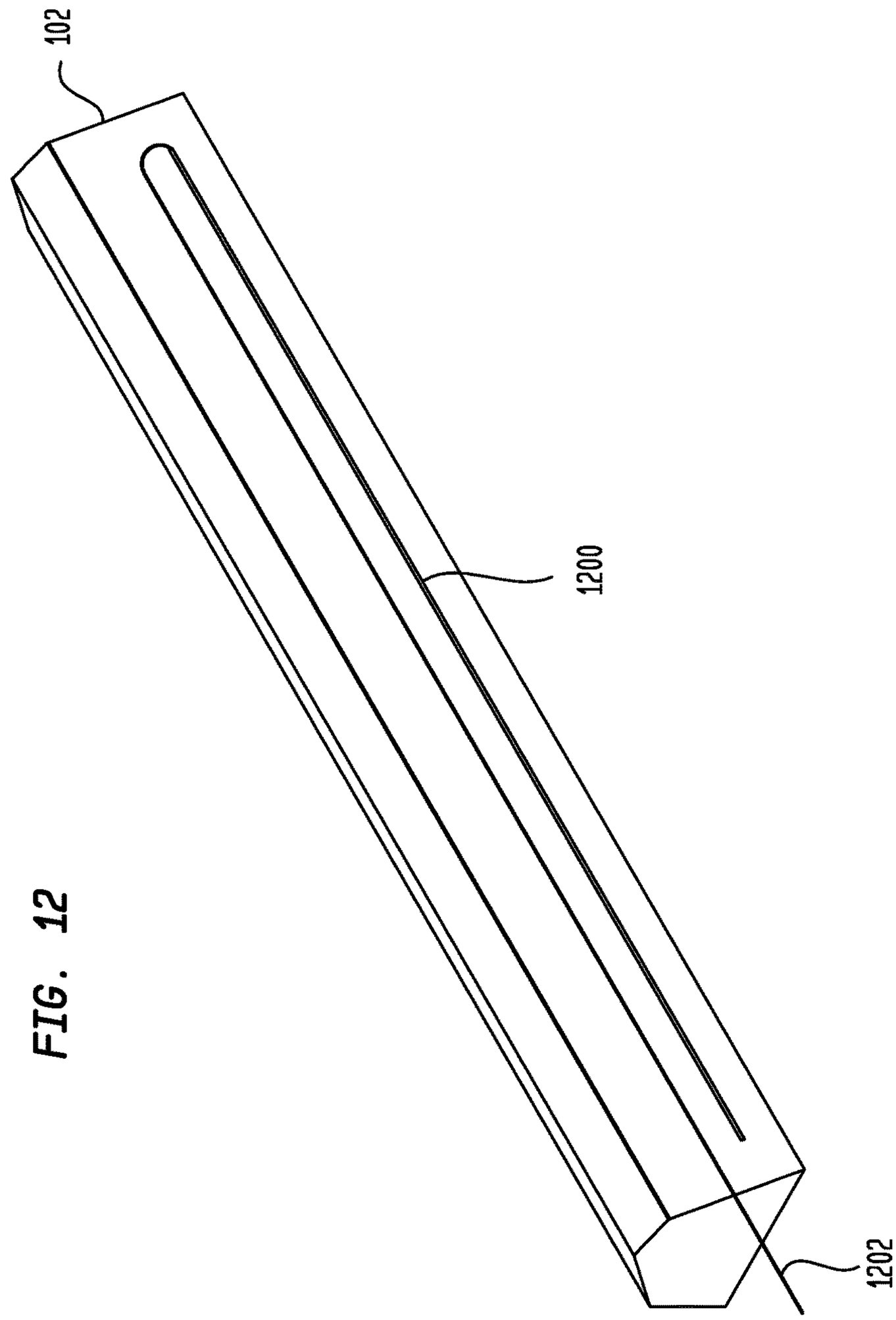


FIG. 12

TONER CARTRIDGE CONTAINER AND SEAL

The present application claims the benefit of U.S. Provisional Patent Application Ser. No. 62/150,005 filed Apr. 20, 2015 which is incorporated by reference herein in its entirety.

BACKGROUND

The present invention generally relates to toner containers, seals, and the like, and more particularly to a toner container which holds toner in a printer toner cartridge or the like.

In the imaging industry, there is a growing market for the remanufacture and refurbishing of various types of replaceable imaging cartridges such as toner cartridges, drum cartridges, inkjet cartridges, and the like. These imaging cartridges are used in imaging devices such as laser printers, xerographic copiers, inkjet printers, and facsimile machines, for example. Imaging cartridges, once spent, are unusable for their originally intended purpose. Without a refurbishing process these cartridges would simply be discarded, even though the cartridge itself may still have potential life. As a result, techniques have been developed specifically to address this issue. These processes may entail, for example, the disassembly of the various structures of the cartridge, replacing toner or ink, cleaning, adjusting or replacing any worn components and reassembling the imaging cartridge.

Imaging cartridges include one or more compartments holding the marking material which is deposited on a surface, such as paper. For a laser toner cartridge, this compartment may be referred to as the toner hopper.

Cartridge seals prevent toner from leaking out of the toner cartridge during shipping and handling. Cartridge seals are removed either by the end user or automatically by the printer prior to printing. During remanufacturing of a cartridge it is necessary to replace the cartridge seal so that the cartridge can once again be shipped without the fear of toner leaking out of the cartridge. The HP M252/277 (201A/201X cartridge) contains a sealed bag filled with toner. The seal is attached to the bag by some method of heat and the tail end of the seal is attached to the tone agitator shaft that runs through the cartridge. Once the cartridge is installed into the printer the printer engages a drive gear that is attached to agitator shaft and removes the seal from the bag. The seal then acts as a toner agitator paddle for the remainder of the toner life.

SUMMARY

In one aspect of the present invention, advantageous methods and apparatus for sealing toner within a toner cartridge, such as the HP M252/277 (201A/201X) cartridge, during the original manufacturing or remanufacturing process are provided.

A method of remanufacturing an imaging cartridge comprising a toner hopper having a toner bag and not having a seal port, the method comprising forming a seal port in the toner hopper; disposing a replacement toner container in the toner hopper, the replacement toner container including a removable seal having a seal tail; and inserting a portion of the seal tail through the seal port.

A method of remanufacturing an imaging cartridge comprising a toner hopper having a toner bag and not having a seal port, the method comprising providing a replacement toner hopper having a seal port; removing the toner hopper not having the seal port from the imaging cartridge; and attaching the replacement toner hopper having a seal port to the imaging cartridge.

A replacement toner container may be attached to the replacement toner hopper, and the replacement toner container may include a removable seal having a seal tail, the seal tail extending through the seal port.

The replacement toner hopper may include an integrated enclosure holding toner and a removable seal disposed over a port opening of the integrated enclosure holding toner, and wherein the removable seal includes a seal tail extending from the seal port.

A more complete understanding of the present invention, as well as further features and advantages of the invention, will be apparent from the following detailed description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows an isometric view of a toner bag, toner bag seal and agitator in accordance with aspects of multiple embodiments the present invention;

FIG. **2** shows an isometric view of a toner bag, toner bag seal and agitator in accordance with aspects of multiple embodiments the present invention;

FIG. **3** shows a toner replacement bag in accordance with aspects of the present invention;

FIG. **4** shows a toner bag seal and agitator in accordance with aspects of the present invention;

FIG. **5** shows a view of a toner hopper portion and port barrier in accordance with the present invention;

FIG. **6** shows a toner container and pull seal in accordance with the present invention;

FIGS. **7** and **8** show a toner hopper, toner container and pull seal in accordance with the present invention;

FIG. **9** shows a dual use seal in accordance with the present invention;

FIG. **10** shows a new seal attached to an original OEM seal in accordance with the present invention;

FIG. **11** shows a new portion of a toner hopper with an integrated enclosure in accordance with the present invention; and

FIG. **12** shows a toner container the bag **102** with an interlocking seal **1200** can be used to contain the toner within the cartridge.

DETAILED DESCRIPTION

The embodiments set forth below represent the necessary information to enable those skilled in the art to practice the embodiments and illustrate the best mode of practicing the embodiments. Upon reading the following description in light of the accompanying drawing figures, those skilled in the art will understand the concepts of the disclosure and will recognize applications of these concepts not particularly addressed herein. It should be understood that these concepts and applications fall within the scope of the disclosure and the accompanying claims.

The following detailed description of preferred embodiments refers to the accompanying drawings, which illustrate specific embodiments of the invention. In the discussion that follows, specific systems and techniques for repairing, manufacturing, or remanufacturing an imaging cartridge, such as a toner cartridge, are described. Other embodiments having different structures and operations for the repair, remanufacture, and operation of other types of replaceable imaging components and for various types of imaging

devices, such as laser printers, inkjet printers, copiers, facsimile machines and the like, do not depart from the scope of the present invention.

FIGS. **1** and **2** show views of a remanufactured or replacement assembly **100** in accordance with one aspect of the present invention. The assembly **100** may be suitably disposed in a toner hopper of toner cartridge and may include a toner container **102** (also referred to as a toner bag) holding toner and having toner exit ports **104**. The toner exit ports **104** may be covered and sealed by one end of a seal **106**. Another end of the seal **106** may be attached to an agitator shaft **108**. As seen in FIG. **4**, an agitator blade **110** may also be attached to the agitator shaft **108**. Once the printer begins rotating the agitator shaft **108**, the seal **106** will be pulled thus opening the port on the bag and allowing toner to flow freely to the developing components. FIG. **3** shows another view of the toner container **102** with toner exit ports **104**.

In one aspect, during the remanufacturing process, at least a portion of the components of the assembly **100** may be reused. The original equipment manufacturer (OEM) toner bag and seal can be reused to seal the toner within the cartridge. The OEM bag can be removed from the hopper or left in place during this process. The OEM bag may be cleaned out thoroughly to remove any residual toner. The OEM seal can be reapplied to the OEM toner bag using, for example, adhesive, glue, or a heat method such as heat stake or ultrasonic welding. Toner can either be filled into the bag using the existing toner port prior to applying the seal or a small slit can be made in the bag to add toner. If a small slit is made then it can be sealed by, for example, adhesive, glue, or a heat method.

In one aspect, the OEM bag and seal can be reused to seal the toner within the cartridge. The OEM bag can be removed from the hopper or left in place during this process. The OEM bag may be cleaned out thoroughly to remove any residual toner. The OEM seal can be trimmed to remove the portion where the seal was originally applied to the bag. A new never used portion of the OEM seal can then be applied to the OEM bag using, for example, adhesive, glue, or a heat method such as heat stake or ultrasonic welding. Toner can either be filled into the bag using the existing toner port prior to applying the seal or a small slit can be made in the bag to add toner. If a small slit is made then it can be sealed either by adhesive, glue, or a heat method, for example.

According to another aspect, a new toner bag **102** and new removable seal **106** can be used to seal the toner within the cartridge. The toner bag **102** can be made out of, for example, plastic, foil, or any other suitable flexible material. At least a portion of the toner bag **102** may comprise an air permeable material, such as a polymer microfiber blend, for example. A portion of the bag may comprise a rigid material, such as high impact polystyrene (HIPS). The toner bag **102** can have a toner port **104** or slit for adding toner to the toner bag **102**. The toner port **104** or slit can be sealed by, for example, a screw on cap, plug, adhesive, glue, or heat method such as heat stake or ultrasonic welding. The seal **106** can be either integrated into the bag **102** or can be attached to the outer portion of the bag **102** via, for example, adhesive, glue, or heat method. The end of the seal **106** can be attached to the agitator shaft **108**. Depending on the shape of the seal **106** it can become a toner agitator paddle or the ribbon or pull strip can be coiled/wrapped around the agitator **108** and serve no further purpose.

In another aspect, toner can be filled directly into the toner hopper. The OEM used bag and seal can remain in their current positions. The developing components within the toner cartridge all contact each other therefore providing a seal or barrier that prevents toner from leaking out of the cartridge.

In another aspect, toner can be filled directly into the OEM toner bag located within the hopper without any disassembly required. This will allow toner to enter the hopper without being impeded by the OEM used bag. The OEM used bag, agitator, and seal can remain in their current positions. The toner can be filled into the bag through a hole placed through both the surface of the hopper and the bag. The hole can be created via drilling or heated tooling. The hole can be sealed with, for example, a plug or adhesive backed seal. The developing components within the toner cartridge all contact each other therefore providing a seal or barrier that prevents toner from leaking out of the cartridge.

In another aspect, the toner container **102** may comprise a hard casing within the cartridge. The toner casing **102** can be made of, for example, plastic, metal, or any other suitable rigid material. Toner can be filled into the casing through the toner port prior to installing a seal or through a separate port that can be sealed using, for example, a screw on cap, plug, adhesive, glue, or heat method. A removable seal can be attached to the outer portion of the casing via adhesive, glue, or heat method. The end of the seal can be attached to the agitator shaft. Once the printer begins rotating, the agitator the seal will be pulled thus opening the port on the casing and allowing toner to flow freely to the developing components. Depending on the shape or design of the seal it can become a toner agitator paddle or the ribbon or pull strip can be coiled/wrapped around the agitator and serve no further purpose.

In another aspect, as seen in FIG. **5**, a barrier **500** with port holes **504** can be added within a toner hopper or toner hopper portion **502**. The barrier **500** may be placed between the developing components and the agitator shaft **108** within the hopper **502**. The barrier **500** can be made of, for example, plastic, metal, or any other suitable material. The barrier **500** may be attached to the hopper **502** using adhesive, glue or a heat method. A seal, such as the seals **106**, **106***a*, or **106***b* described herein, can be attached to the inner or outer portion of the barrier **500** via adhesive, glue, heat or other suitable method. If the seal is attached to the inner portion (closest to the agitator shaft) of the barrier **500** then the end of the seal can be attached to the agitator shaft. Once the printer begins rotating the agitator the seal will be pulled thus opening the port on the barrier and allowing toner to flow freely to the developing components. The seal can become a toner agitator paddle or the ribbon or pull strip can be coiled/wrapped around the agitator and serve no further purpose. If the seal is attached to the outer portion (closest to the developing components) of the barrier **500** then the seal will need to be pulled manually by the end user. To allow the end user to pull the seal manually an opening will need to be formed in the hopper using, for example, a blade or rotary tool to feed the end of the seal out of the hopper. With the end of the seal extending out of the hopper the end user can now pull the seal prior to installing the cartridge into the printer thus opening the port on the barrier and allowing toner to flow freely to the developing components.

In another aspect, a new toner bag **102** and a removable seal **106***a* can be used to seal the toner within the cartridge. FIG. **6** shows the removable seal **106***a* comprising a seal body **600** and a seal tail **602** which is pulled by the end user. The seal body **600** may comprise, for example, a flexible or semi-flexible body made of plastic or other suitable material with a plastic, polymer coated fiber or other suitable material attached using adhesive, heat or other methods. The bag **102**

can be made out of materials including plastic, foil, a hard casing or any other suitable material. The bag **102** can be installed within the toner hopper and attached to the cartridge by any suitable method such as adhesive, glue, or a heat method, for example. The bag **102** can have ports **104** or another opening for adding toner to the bag **102**. The seal **106***a* can be either integrated into the bag **102** or can be attached to the outer portion of the bag **102** via adhesive, glue, or heat method, for example, as seen in FIG. **6**. The seal tail **602** can be pulled manually by the end user prior to printing to allow toner to exit the toner bag **102**.

As shown in FIG. **7**, to allow the end user to pull the seal tail **602** manually, a seal port **702** can be formed in the toner hopper **700** to feed the end of the seal tail **602** out of the hopper **700**. The seal port **702** may be formed through conventional cutting methods or other techniques. Alternatively, the seal tail **602** can be fed through an existing opening in the toner hopper **700**. Alternatively, a new toner hopper **700** may be provided with the seal port **702** to replace the original hopper lacking a seal port. Alternatively, an end cap or other portion of the original toner hopper **700** may be replaced an end cap **704** having the seal port **702**.

With the end of the seal tail **602** extending out the seal port **702** the end user can now pull the seal tail **602** prior to installing the cartridge into the printer, thus removing a portion of the seal body **600** covering the toner exit ports **104** and allowing toner to flow freely to the developing components. FIG. **8** shows a view of a toner hopper **700** with the seal tail **602** extending from an opening **702** in the hopper and the bag **102** installed within the hopper **700**.

In another aspect, FIG. **9** shows views of a dual use seal **106***b* which can be attached to and removed the agitator shaft **108** or removed by the end user through a slot in the cartridge. A seal body **900** includes a removable portion **902** adapted for attachment to the agitator shaft **108**. Holes **904** may be attached to posts of the agitator shaft **108**. If attached to the agitator shaft **108**, a seal tail **906** may be removed, forming a seal similar to the seal **106**. If the seal **106***b* is to be removed by an end user, the portion **902** may be removed, forming a seal similar to **106***a*. In one embodiment the removable portion **902** may be torn away along line **910** using a tab **908** to cause the material of the seal to tear. The seal **106***b* may comprise, for example, a flexible or semi-flexible body made of plastic or other suitable material with a plastic, polymer coated fiber or other suitable material attached using adhesive, heat or other methods.

In another aspect, a new bag and removable seal can be used to seal the toner within the cartridge. The bag can be made out of plastic, foil, or any other suitable flexible material. The new bag can be installed within the cartridge using adhesive, glue, heat, or other suitable method. The bag may have a port or slit for adding toner to the bag. The port or slit can be sealed by a screw on cap, plug, adhesive, glue, or heat method such as heat stake or ultrasonic welding. A seal **1000** can be either integrated into the bag or can be attached to the outer portion of the bag via adhesive, glue, or heat method. As seen in FIG. **10**, the seal **1000** can be attached to the original OEM seal **106** which is still attached to the agitator shaft. Once the printer begins rotating the agitator **108**, the OEM seal **106** will pull the seal **100** that is attached to or incorporated into the toner bag **102** thus opening the port on the bag and allowing toner to flow freely to the developing components. The seal that is removed from the bag will remain attached to the OEM seal and become an agitator paddle within the hopper.

In another, as seen in FIG. **11**, a new hopper section **1100** with an integrated enclosure **1102** for holding the toner can be used. An OEM toner hopper may comprise two or more sections that are sonically welded together. Once the OEM hopper has been split into two sections, either one of the two OEM hopper sections can be pared with a brand new molded hopper section. The new molded hopper section **1100** can have an enclosure **1102** that can contain the toner. The new hopper section **1100** and enclosure **1102** may be molded as a single piece out of plastic. The enclosure **1102** that is built into the hopper section can have one or more port openings **1104** to install the toner. A seal, such as seal **106**, seal **106***a* or seal **106***b*, can be attached to a surface **1106** of the enclosure **1102** over the port openings **1104**. Once toner is sealed within the enclosure **1102** of the new hopper section **1100** it can then be mated with the opposite OEM section to make a whole hopper. When the cartridge is ready to be used the seal can either be removed from the enclosure manually by the end user or can be removed automatically by the printer depending on the design of the seal. Toner will then be free to flow from the enclosure and to the developing components.

In another aspect, as seen in FIG. **12**, the bag **102** with an interlocking seal **1200** can be used to contain the toner within the cartridge. The bag **102** can be made out of plastic, foil, or other suitable material. The bag **102** can be installed within the cartridge using adhesive, glue, heat or other suitable method. Toner can also be added to the bag through the opening of the interlocking seal port **1200** before it is closed. The interlocking seal port **1200** can be comprised of two halves of the bag that lock together through some locking method. An example would be a zip lock bag or a zipper on a jacket. Locking the two halves together would seal the toner within the bag. A pull string or ribbon **1202** can be attached to the zipper on the bag. The string or ribbon **1202** can be fed through a hole or slot on the hopper. The end user can manually pull on the string or ribbon **1202** prior to installing the cartridge into the printer which will open up the interlocking port **1200** on the bag **102** and allowing toner to flow freely to the developing components. The end of the string/ribbon can also be attached to the agitator shaft **108**. When the cartridge is installed into the printer the agitator will spin which will automatically pull the string/ribbon and open the interlocking port of the bag allowing toner to flow freely to the developing components.

Although specific embodiments have been illustrated and described herein, those of ordinary skill in the art appreciate that any arrangement which is calculated to achieve the same purpose may be substituted for the specific embodiments shown and that the invention has other applications in other environments. This application is intended to cover any adaptations or variations of the present invention. The following claims are in no way intended to limit the scope of the invention to the specific embodiments described herein.

What is claimed is:

1. A dual-use toner hopper seal comprising:

a seal body comprising a removable portion;

a removable seal tail attached to the seal body; and

a tab attached to the removable portion to tear and remove the removable portion from the seal body along a line in a longitudinal direction of the seal body,

wherein when the removable portion is removed from the seal body, the seal body is removable by an end user through a slot in a toner cartridge;

wherein the removable portion comprises holes for attachment to an agitator shaft of the toner cartridge, and

wherein when the seal tail is removed from the seal body and the removable portion is attached to the agitator

shaft along the longitudinal direction of the seal body, the seal body is removable by rotating the agitator shaft by a printer.

2. The dual-use toner hopper seal of claim **1** wherein the seal body comprises a flexible body.

3. The dual-use toner hopper seal of claim **1** wherein the seal comprises a semi-flexible body.

4. A method of using a dual-use toner hopper seal comprising a seal body and a removable tail, said seal body having a removable portion and a tab attached to the removable portion, the method comprising:

if the dual-use toner hopper seal is to be removed by an agitator shaft of a toner cartridge, then removing the seal tail and attaching the removable portion to the agitator shaft of the toner cartridge; and

if the dual-use toner hopper seal is to be removed by an end user pulling the seal tail through a slot in the toner cartridge, then removing the removable portion from the seal body using the tab attached to the removable portion.

* * * * *